

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-30 (Cancelled)

Claim 31 (Previously presented) An organic-inorganic hybrid material comprising two phases:

- a first, mineral phase comprising a structured mesoporous network with open porosity, wherein the structured mesoporous network exhibits an organized structure with a repeating unit; and
- a second, organic phase comprising an organic polymer, said organic phase not participating in creating the structured mesoporous network of the mineral phase and being essentially not present inside the pores of the structured mesoporous network of the mineral phase.

Claim 32 (Previously presented) The material of claim 31, further comprising a third phase, inside the pores, composed of at least one surface active agent.

Claim 33 (Previously presented) The material of claim 31, wherein the mineral phase and the organic phase are continuous and intermingled.

Claim 34 (Previously presented) The material of claim 31, wherein the mineral phase is discontinuous and dispersed in the organic phase, which is continuous.

Claim 35 (Previously presented) The material of claim 31, wherein the mineral phase has conductive and/or hydrophilic functions on the surfaces of its pores.

Claim 36 (Previously presented) The material of claim 31, wherein the organic phase has conductive and/or hydrophilic functions.

Claim 37 (Previously presented) The material of claim 35, further comprising a third phase, inside the pores, composed of at least one surface active agent, wherein the third phase has conductive and/or hydrophilic functions.

Claim 38 (Previously presented) The material of claim 35, wherein said conductive functions are selected from cation exchange groups.

Claim 39 (Previously presented) The material of claim 38, wherein said cation exchange groups are selected from the following groups: SO₃M; -PO₃M₂; -COOM and B(OM)₂, where M represents hydrogen, a monovalent metal cation, or ⁺NR¹₄, where each R¹, independently, represents a hydrogen, an alkyl radical or an aryl radical.

Claim 40 (Previously presented) The material of claim 35, wherein said conductive functions are selected from anion exchange groups.

Claim 41 (Previously presented) The material of claim 40, wherein said anion exchange groups are selected from the following groups: pyridyl, imidazolyl, pyrazolyl; triazolyl; the radicals of formula ⁺NR²₃X, where X represents F, Cl, Br, I, NO₃, SO₄H or OR, R being an alkyl radical or an aryl radical, and where each R², independently, represents a hydrogen, an alkyl radical or an aryl radical; and the basic aromatic or nonaromatic radicals containing at least one radical selected from imidazole, vinylimidazole, pyrazole, oxazole, carbazole, indole, isoindole, dihydrooxazole, isoxazole, thiazole, benzothiazole, isothiazole, benzimidazole, indazole, 4,5-dihydropyrazole, 1,2,3-oxadiazole, furazan, 1,2,3-thiadiazole, 1,2,4-thiadiazole, 1,2,3-benzotriazole, 1,2,4-triazole, tetrazole, pyrrole, aniline, pyrrolidine, and pyrazole radicals.

Claim 42 (Previously presented) The material of claim 31, wherein the mineral phase is composed of at least one oxide selected from metal oxides, metalloid oxides and mixed oxides thereof.

Claim 43 (Previously presented) The material of claim 42, wherein said oxide is selected from the oxides of silicon, titanium, zirconium, hafnium, aluminum, tantalum, tin, rare earths and mixed oxides thereof.

Claim 44 (Previously presented) The material of claim 31, wherein the mesoporous network has an organized structure with a repeating unit.

Claim 45 (Previously presented) The material of claim 44, wherein the mesoporous network has a cubic, hexagonal, lamellar, vermicular, vesicular or bicontinuous structure.

Claim 46 (Previously presented) The material of claim 31, wherein the size of the pores is from 1 to 100 nm.

Claim 47 (Previously presented) The material of claim 31, wherein the organic polymer is a thermally stable polymer.

Claim 48 (Previously presented) The material of claim 47, wherein the organic polymer is selected from polyetherketones; polysulfones; polyethersulfones; polyphenylethersulfones; styrene/ethylene, styrene/butadiene, and styrene/isoprene copolymers; polyphenylenes; polyimidazoles; polyimides; polyamideimides; polyanilines; polypyrrroles; polysulfonamides; polypyrazoles; polyoxazoles; polyethers; poly((meth)acrylic acid)s; polyacrylamides; polyvinyls; acetal resins; polyvinylpyridines; polyvinylpyrrolidones; polyolefins; poly(styrene oxide)s; fluoro resins and polyperfluorocarbons; poly(vinylidene fluoride)s; polychlorotrifluoroethylenes; polyhexafluoropropenes; perfluoroalkoxides; polyphosphazenes; silicone elastomers; and block copolymers comprising at least one block composed of a polymer selected from the above polymers.

Claim 49 (Previously presented) The material of claim 32, wherein the surface active agent is selected from: alkyltrimethylammonium salts, alkyl phosphate salts and alkylsulfonate salts; dibenzoyltartaric acid, maleic acid or long-chain fatty acids; urea or long-chain amines; phospholipids; doubly hydrophilic copolymers whose amphiphilicity is generated in situ by interaction with a substrate; and amphiphilic multiblock copolymers comprising at least one hydrophobic block in combination with at least one hydrophilic block.

Claims 50-60 (Cancelled)

Claim 61 (Previously presented) The material of claim 36, further comprising a third phase, inside the pores, composed of at least one surface active agent, wherein the third phase has conductive and/or hydrophilic functions.

Claim 62 (Previously presented) The material of claim 36, wherein said conductive functions are selected from cation exchange groups.

Claims 63-65 (Cancelled)

Claim 66 (Previously presented) The material of claim 42, wherein said oxide is selected from the oxides of europium, cerium, lanthanum, and gadolinium, and mixed oxides thereof.

Claim 67 (Previously presented) The material of claim 31, wherein the size of the pores is from 1 to 50 nm.

Claim 68 (New) A membrane comprising the material of claim 31, optionally deposited on a support.

Claim 69 (New) An electrode comprising the material of claim 31.

Claim 70 (New) A fuel cell comprising at least one membrane comprising the material of claim 31 and/or an electrode comprising the material of claim 31.

Claim 71 (New) A process for preparing the material of claim 31, comprising the following steps:

a) – preparing a solution, in a solvent, of a mineral precursor A intended to constitute the mesoporous mineral phase, and optionally hydrolyzing this solution and allowing the solution to age;

b) preparing a solution, in a solvent, of a surface active agent D, a templating, texturizing agent for the mesoporous mineral phase;

c) – preparing a solution, in a solvent, of an organic polymer E;

d) – at the end of steps a), b) and c), adding the solution of templating agent D to the solution of organic polymer E and carrying out homogenization, and then adding the solution of mineral precursor A with stirring to the resultant mixture of the solutions of surface active agent D and of organic polymer E; or

adding the solution of precursor A to the solution of surface active agent D and carrying out homogenization, and then adding the solution of organic polymer E with stirring; or

adding the solution of precursor A to the solution of organic polymer E and carrying out homogenization, and then adding the solution of surface active agent D with stirring;

whereby an organic-inorganic hybrid solution is obtained;

and the resultant organic-inorganic hybrid solution is optionally allowed to age;

e) – depositing or impregnating the organic-inorganic hybrid solution on a support;

f) – evaporating solvents under controlled pressure, temperature, and humidity conditions;

g) – carrying out a heat treatment to consolidate the deposited or impregnated material;

h) – optionally removing the surface active agent D completely or partially;

i) – optionally separating or removing the support.

Claim 72 (New) The process of claim 71, wherein a chelating agent B is further added to the solution of mineral precursor A.

Claim 73 (New) The process of claim 71, wherein, to the solution of mineral precursor A, a compound C is further added which carries, on the one hand, conductive and/or hydrophilic functions and/or precursor functions of conductive and/or hydrophilic functions, and, on the other hand, functions capable of undergoing bonding to the surface of the pores of the mesoporous network.

Claim 74 (New) The process of claim 71, wherein the process further comprises a final step of treatment to liberate or generate conductive and/or hydrophilic functions on the surface of the pores of the material.

Claim 75 (New) The process of claim 71, wherein the solution A is left to age at a temperature of 0°C to 300°C at a pressure of 100 Pa to 5·10⁶ Pa; for a time of a few minutes to a few days.

Claim 76 (New) The process of claim 71, wherein the organic-inorganic hybrid solution obtained in step d) is left to age at a temperature of 0 to 300°C at a pressure of 100 Pa to 5·10⁶ Pa; for a time of a few minutes to a few days.

Claim 77 (New) The process of claim 71, wherein the solvents are evaporated at a temperature of 0 to 300°C; at a relative humidity (RH) of 0 to 100%.

Claim 78 (New) The process of claim 71, wherein, in step e), the organic-inorganic hybrid solution is deposited or impregnated on a support by a method selected from the method of deposition by centrifugal coating known as spin coating, the method of deposition by immersion and withdrawal known as dip coating, the method of deposition by laminar coating known as meniscus coating, the method of deposition by spraying known as "spray coating", the method of deposition by casting and the method of deposition by evaporation.

Claim 79 (New) The process of claim 71, wherein the solution A is left to age at a temperature of 20°C to 200°C; at a pressure of 1000 Pa to 2·10⁵ Pa; and for a time of one hour to one week.

Claim 80 (New) The process of claim 71, wherein the organic-inorganic hybrid solution obtained in step d) is left to age at a temperature of 20°C to 200°C; and at a pressure of 1000 Pa to 2·10⁵ Pa; for a time of one hour to one week.

Claim 81 (New) The process of claim 71, wherein the solvents are evaporated at a temperature of 10°C to 160°C; and at a relative humidity (RH) of 20% to 95%.